

VISTA: The Telescope challenge

Systems Engineering the Solution?

Systems Engineering at the Core of VISTA Design



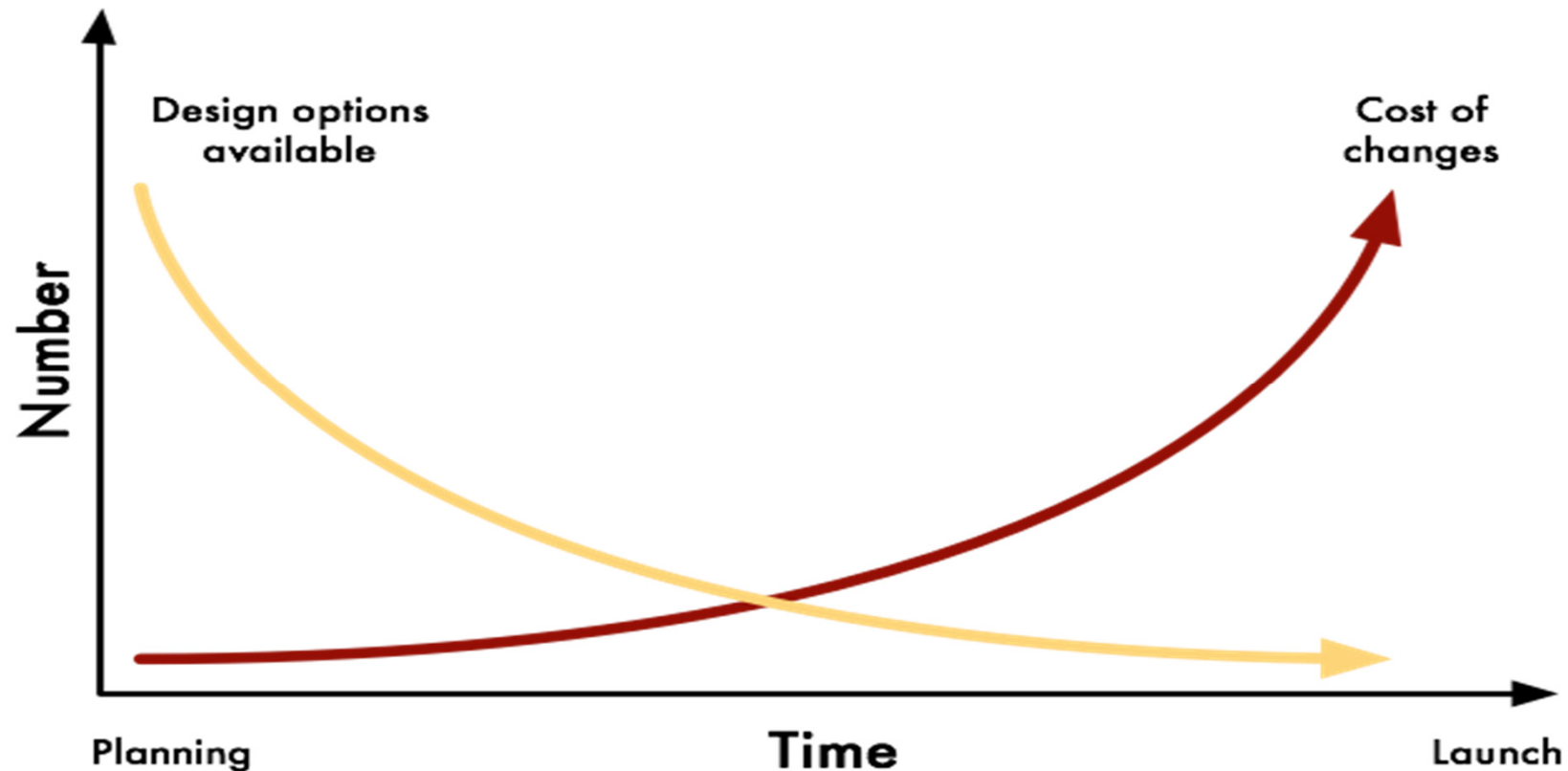
- *UK ATC Project Office Proposal*
- *“The purpose of VISTA is to conduct large-scale semi-automated surveys of the sky at IR and visible wavelengths. Our concept of VISTA is not a conventional 4m telescope with instruments. We regard VISTA as a single integrated camera with an IR and a Visible channel, in which the "telescope" is really the fore-optics.”*

Phase A and Phase B

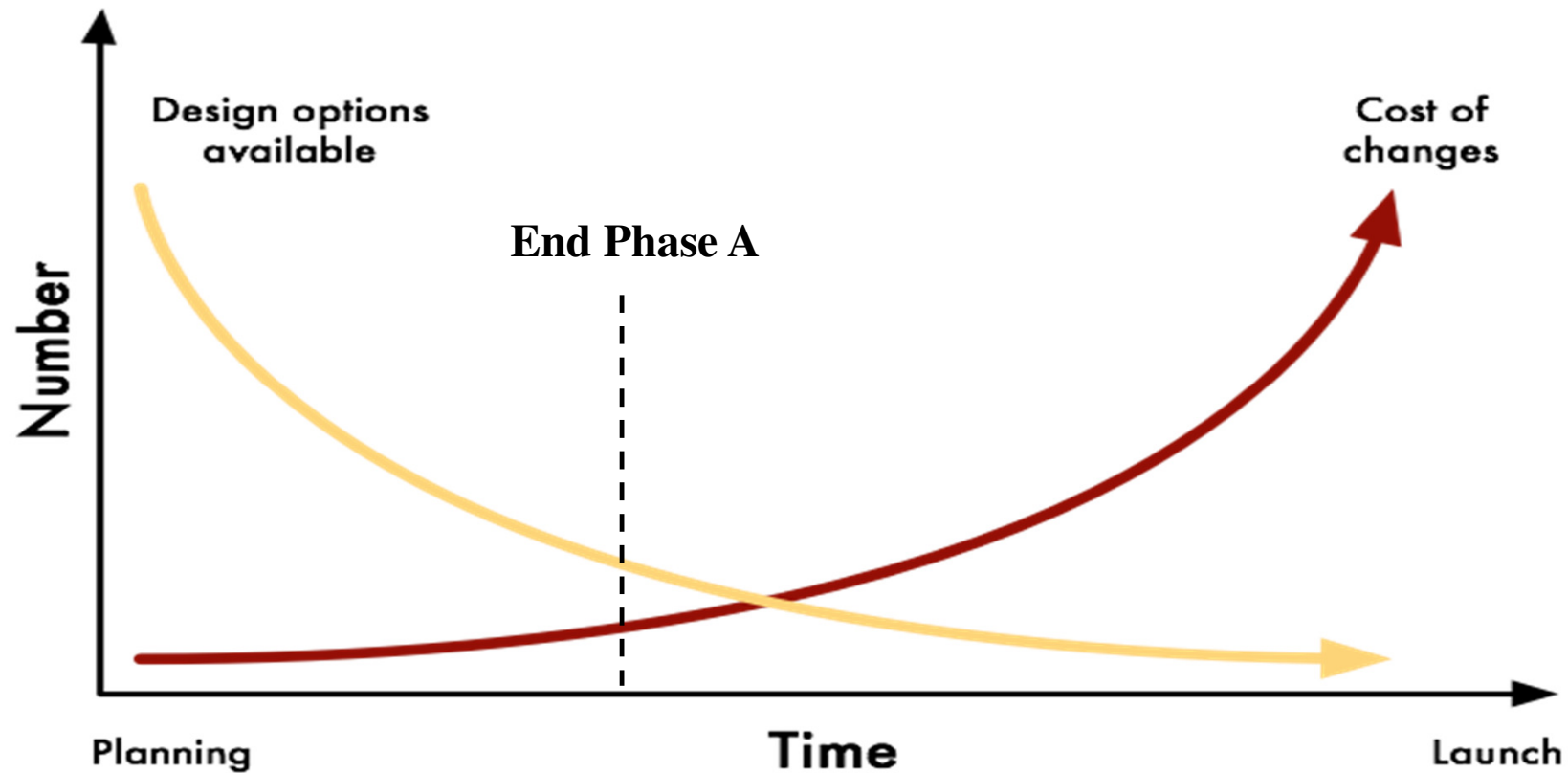


- **Phase A proposal**
 - Can VISTA actually be achieved for the Money?
 - Develop designs to level to demonstrate compliance with Science Requirements
 - Determine the best strategy for maximising functionality within budget and timescales
 - Agree Strategy and Deliverables before starting Phase B
- **Phase B**
 - Follows successful Phase A
 - Same personnel
 - Procurement
 - Testing
 - Integration
 - Commissioning
- **Enhanced VISTA**
 - Additional funding for full functionality

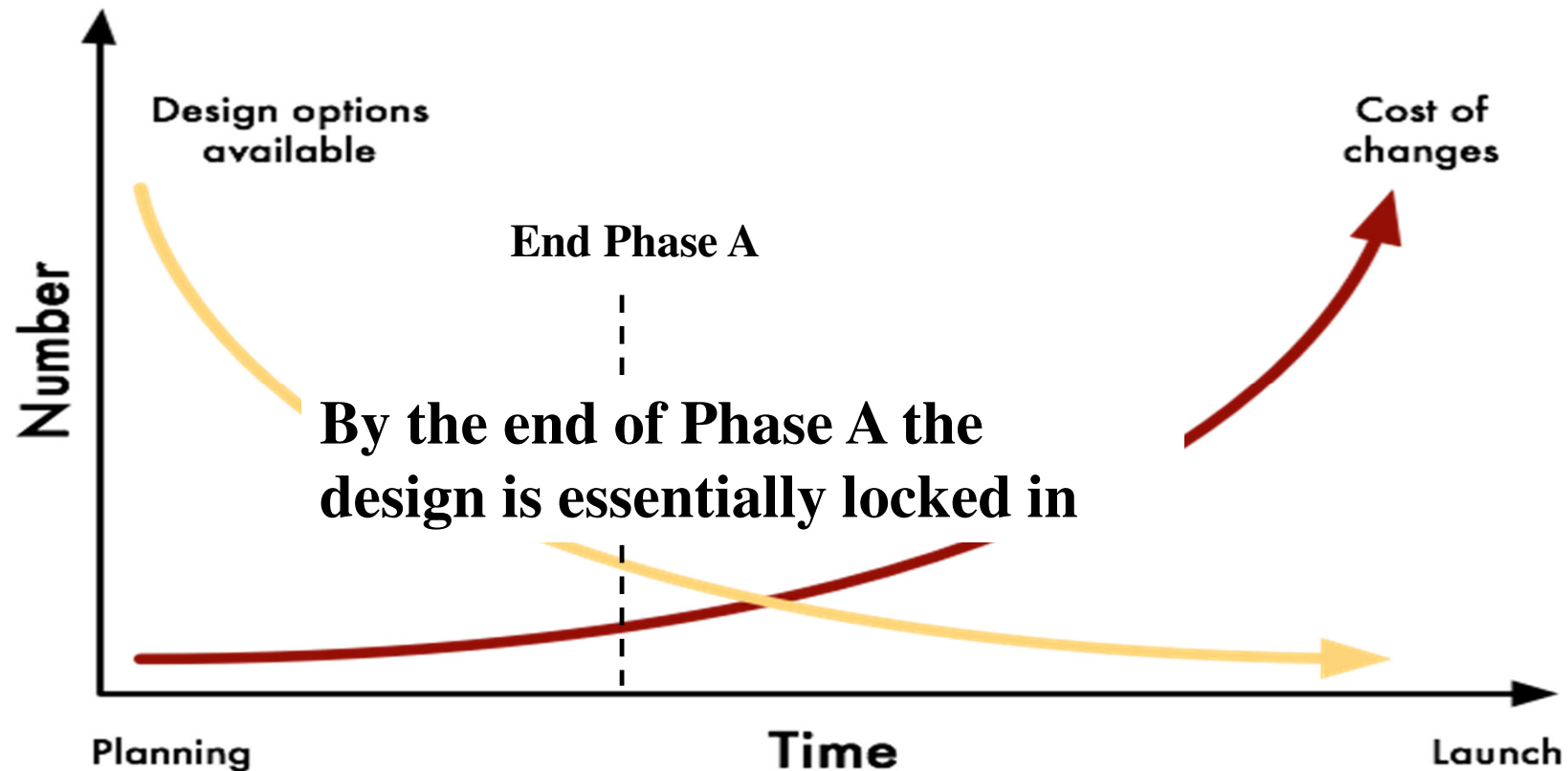
Cost v's Change v's Time



Cost v's Change v's Time



Cost v's Change v's Time



Design Development

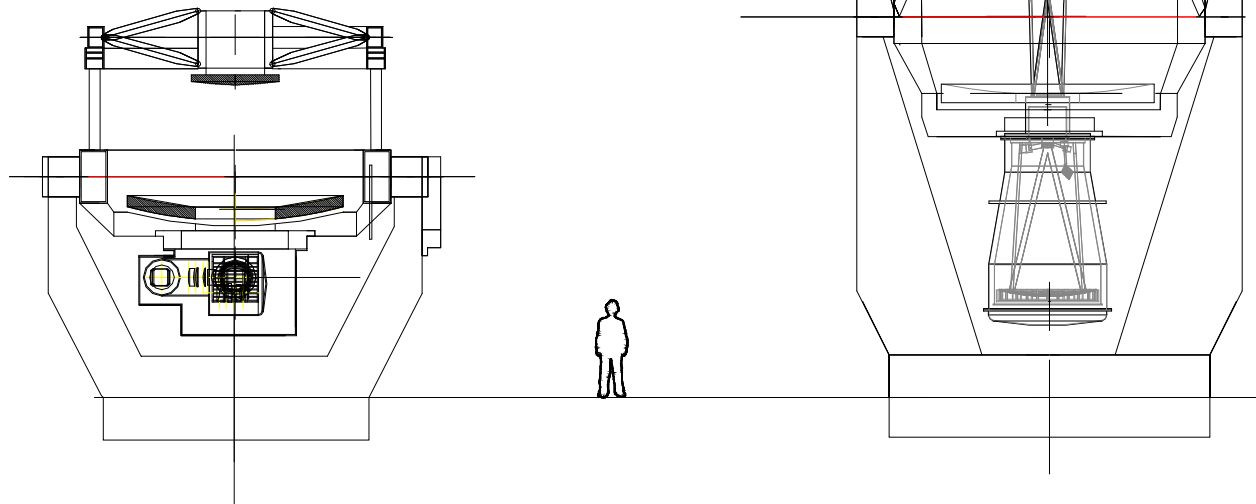


- **JIF Design Baseline resulting in f/2.5 primary**
- **Brainstorm of various layouts**
- **f/1 identified as potential cost saver**
- **f/1 and f/2.5 progressed to level demonstrating a clear advantage to the f/1 design**
- **Need to concentrate on one design**
- **MO recommended proceeding with f/1 design**
 - scheduled Design Validation Review
 - **VEB approved development of f/1 in interim as long lead procurement**

VISTA Designs



- **f/2.5 “JIF design”**
- **f/1 with both instruments mounted at cassegrain focus**
- **f/1 was clearly more cost effective**
 - f/1 has tolerance issues on M2
- **Design still based on 3x3 array**

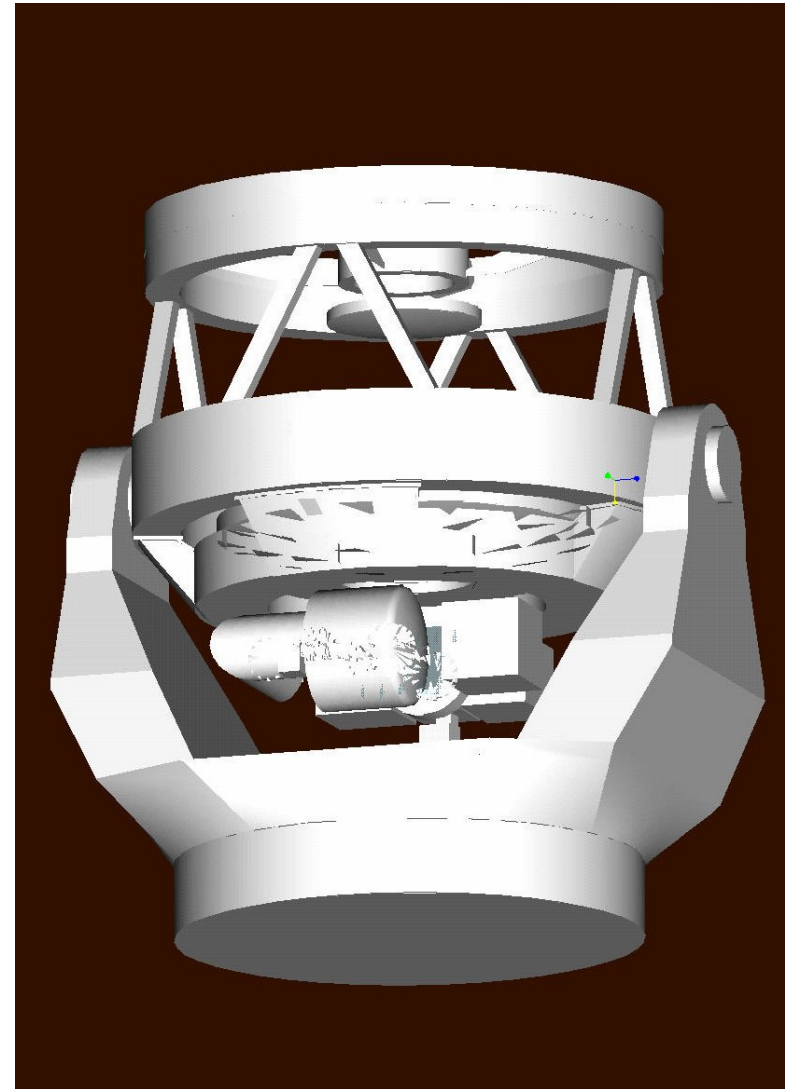


The Design Validation Review



- **Purpose**

- Review choice of design
 - MO has identified f/1 type design as most suitable for VISTA
 - Close out all design other optical layouts
- Determine if choice is correct
- Identify any issues in adopting this approach



The ESO involvement



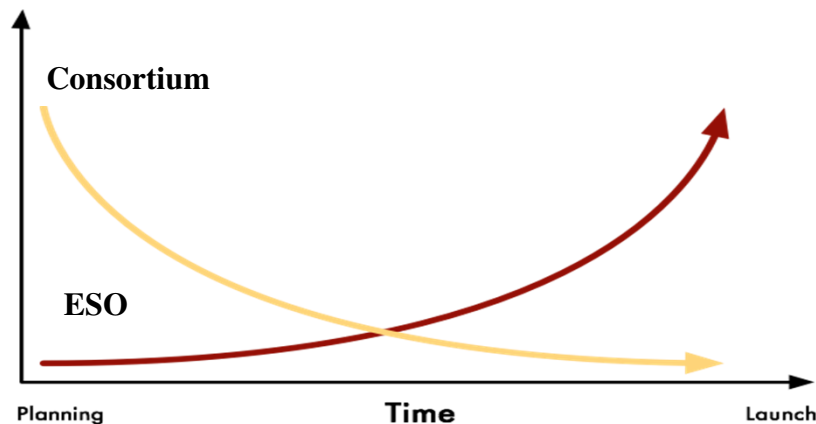
- **Who's the Customer?**
 - Vista Consortium?
 - ESO?
- **Pros and Cons**
 - Site
 - Standards
 - Requirements
 - SOWs
 - Software definition
 - Hardware definition
 - 3x3 to 4x4 focal plane

The ESO involvement



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- **Pros and Cons**

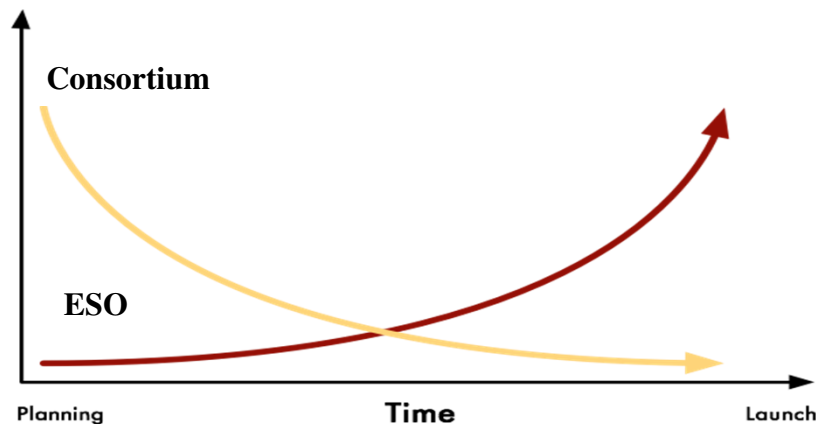
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Filming “*007: Quantum of Solace*”



Paranal Geology



- **Where is the bedrock?**
 - Plateau 20m excavation
 - NTT 5m leveling

- **What about construction?**
 - Plateau: Dust, noise pollution
- **What about Utilities?**
 - Plateau £0.3m
 - NTT £0.5m





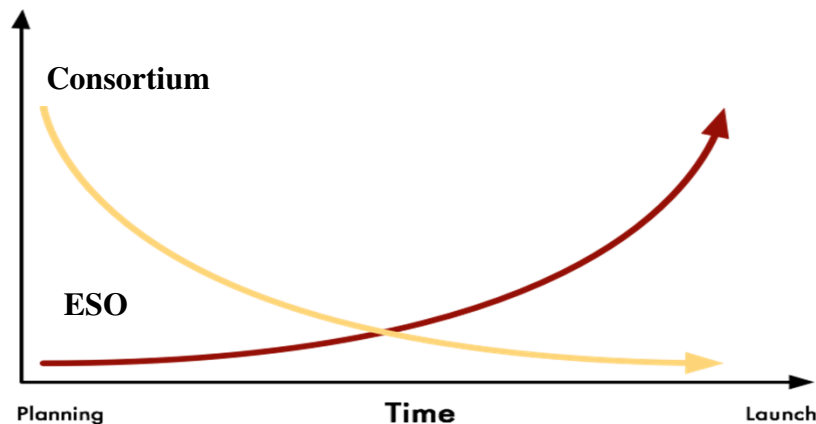


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Requirements



- **All requirements:**
 - **Shall be** unambiguous and tied to performance metrics that are verifiable, achievable and realistic.
 - **Shall not be** solution specific, vague or impossible to verify.

and Goals?



- ***Goals are not requirements.***
 - Though **they may** become requirements
 - Logical development (with additional resources, funding etc.)
 - By osmosis – Spec creep
- ***Goals:***
 - shall not be needed to achieve the science performance (that is a requirement).
 - Each goal must have an underlying requirement.
 - As soon as cost and/or schedule are compromised by a goal, the goal is either amended or dropped.
 - The only benefit of including a goal is during in the early stages of development, steering choices between design options.



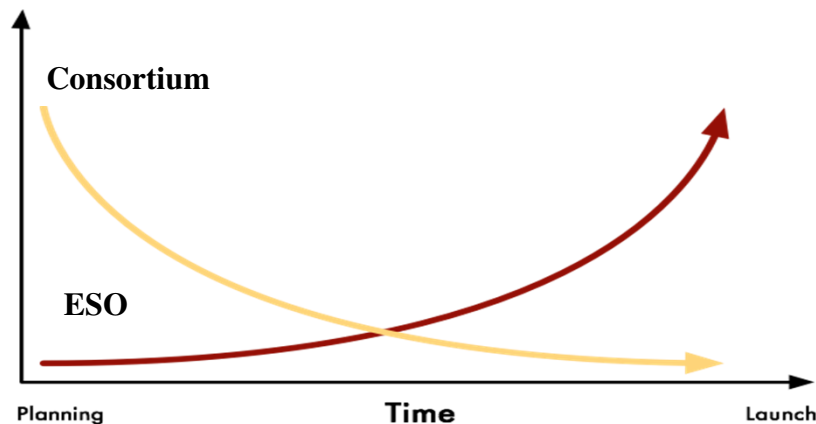
Don't Let
Scope Creep
Do This to
Your Project

The ESO involvement



- **Who's the Customer?**

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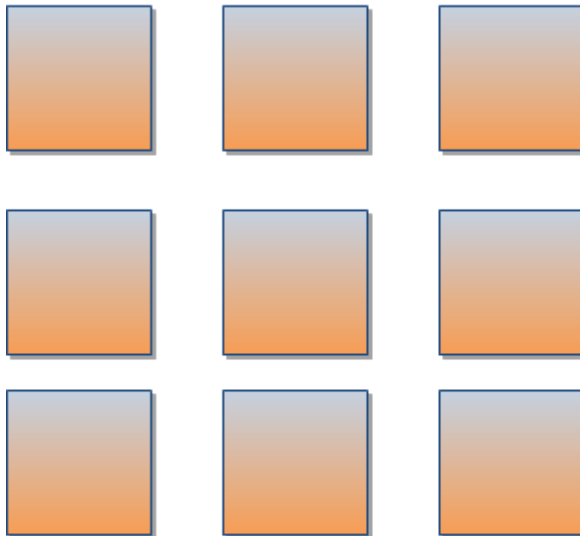


- **Pros and Cons**

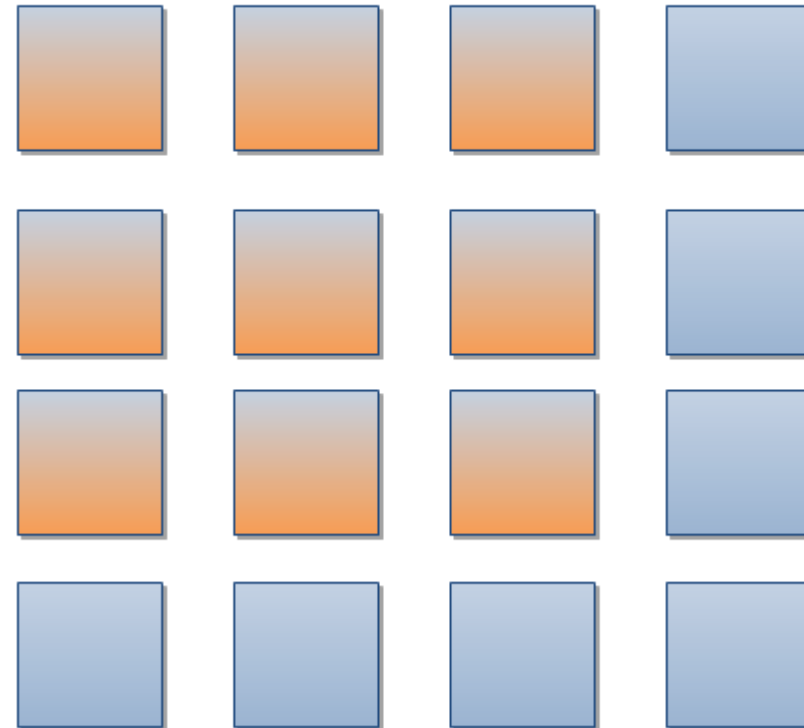
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- 3x3 to 4x4 NIR focal plane

Spec creep?

Requirement



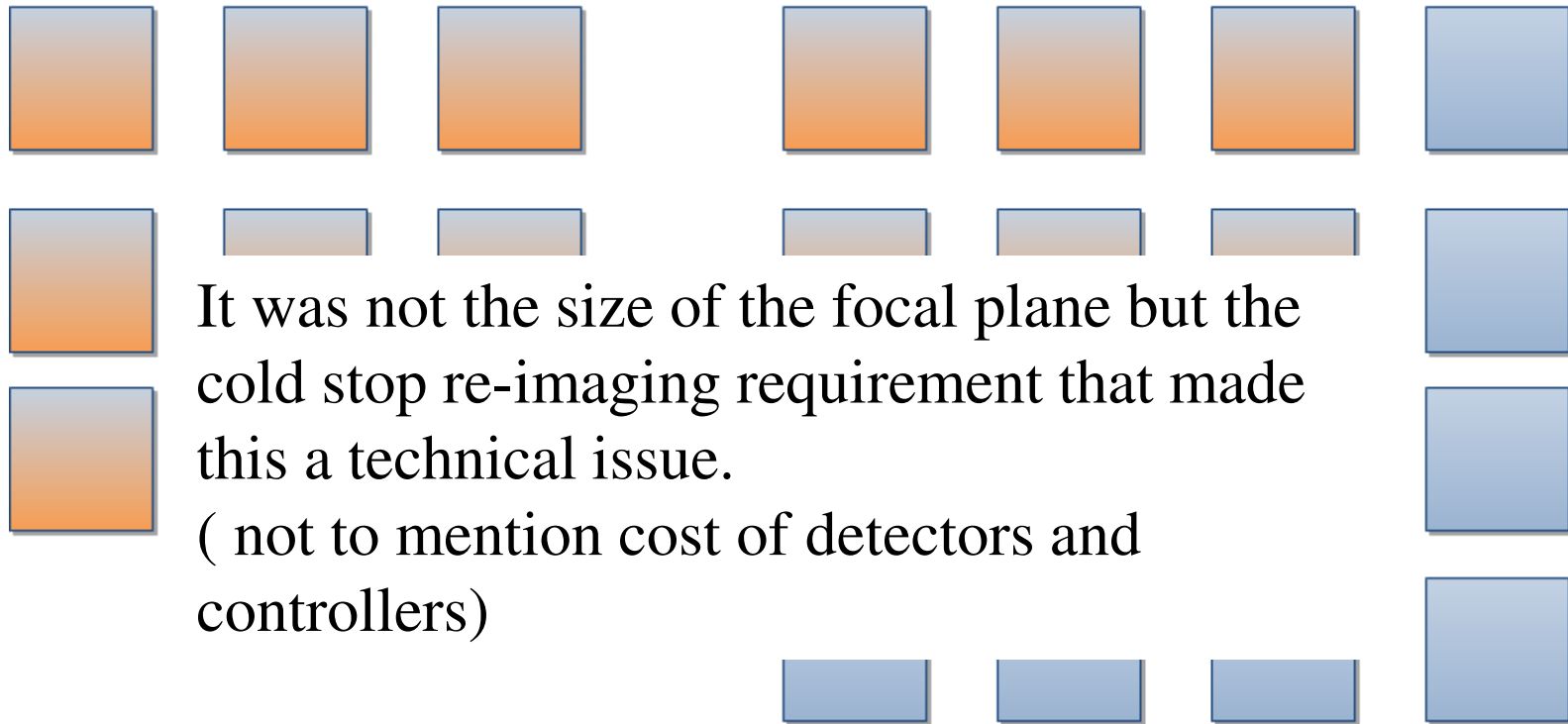
Goal



Spec creep?

Requirement

Goal

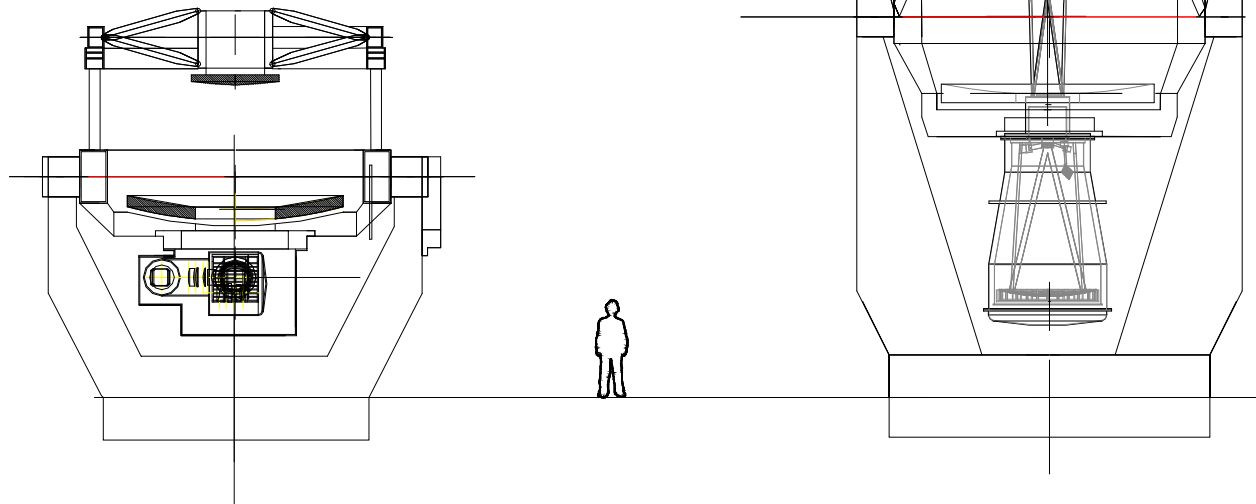


It was not the size of the focal plane but the cold stop re-imaging requirement that made this a technical issue.
(not to mention cost of detectors and controllers)

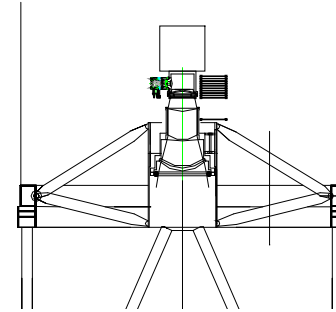
VISTA Designs



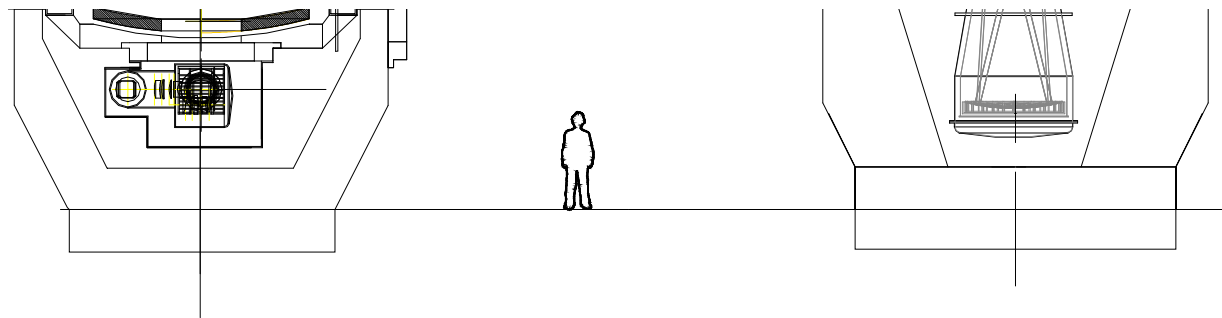
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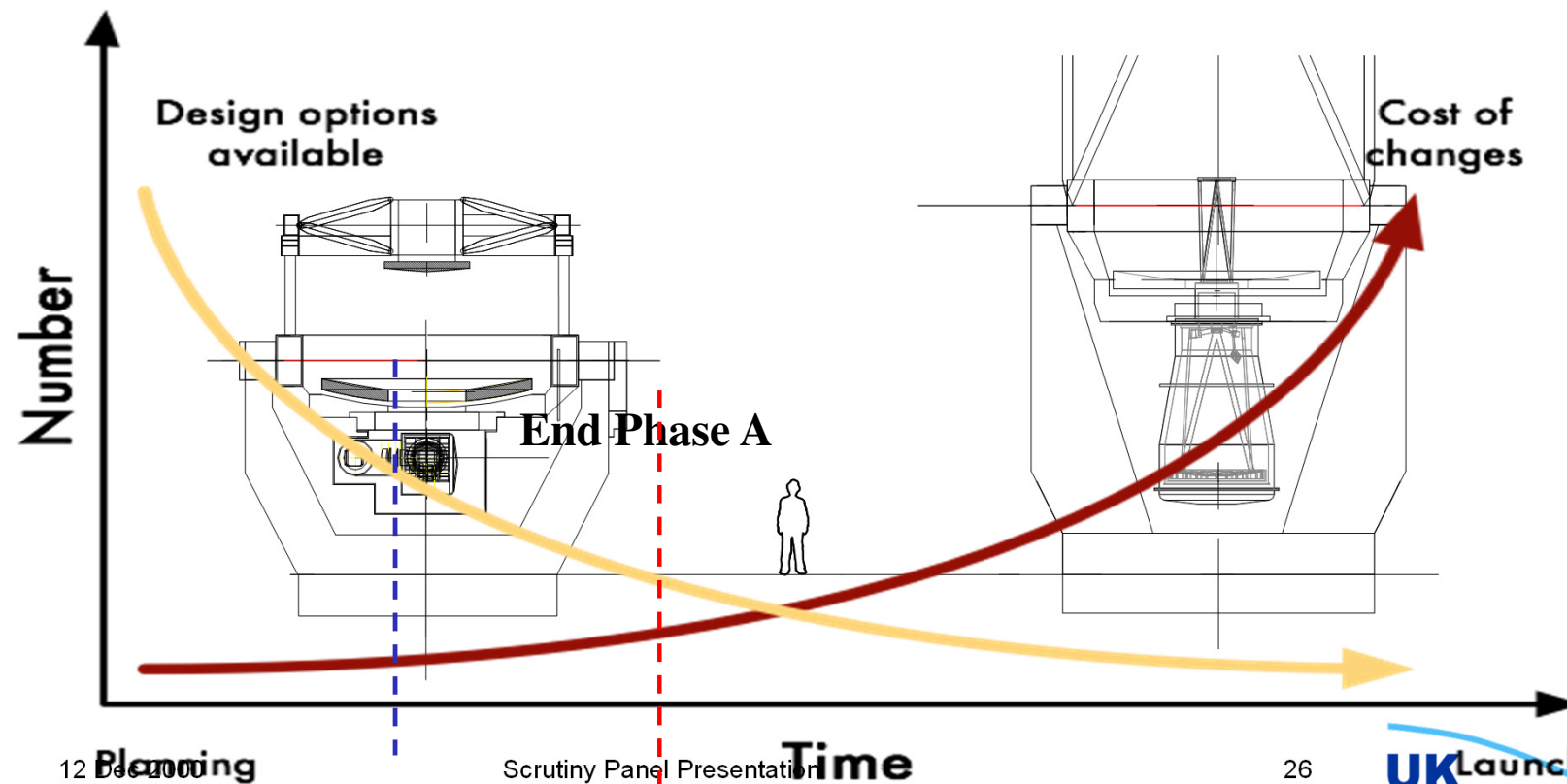
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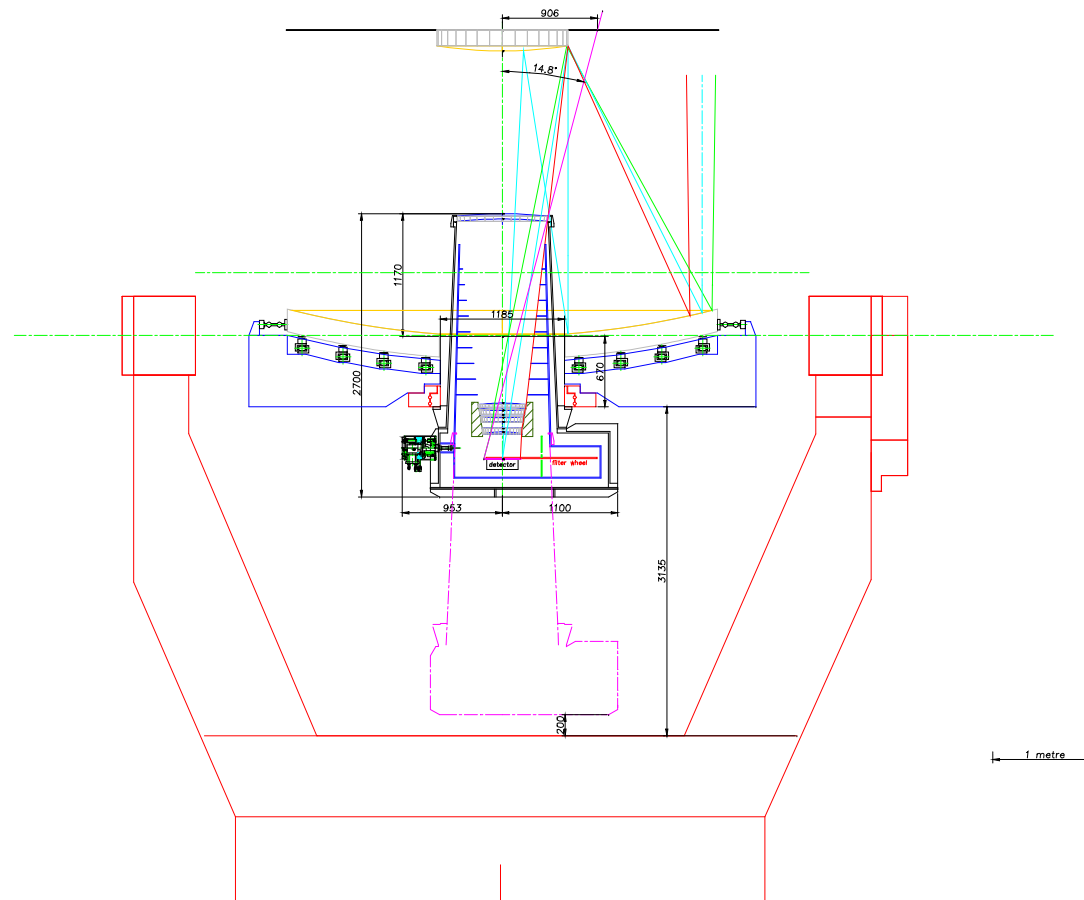


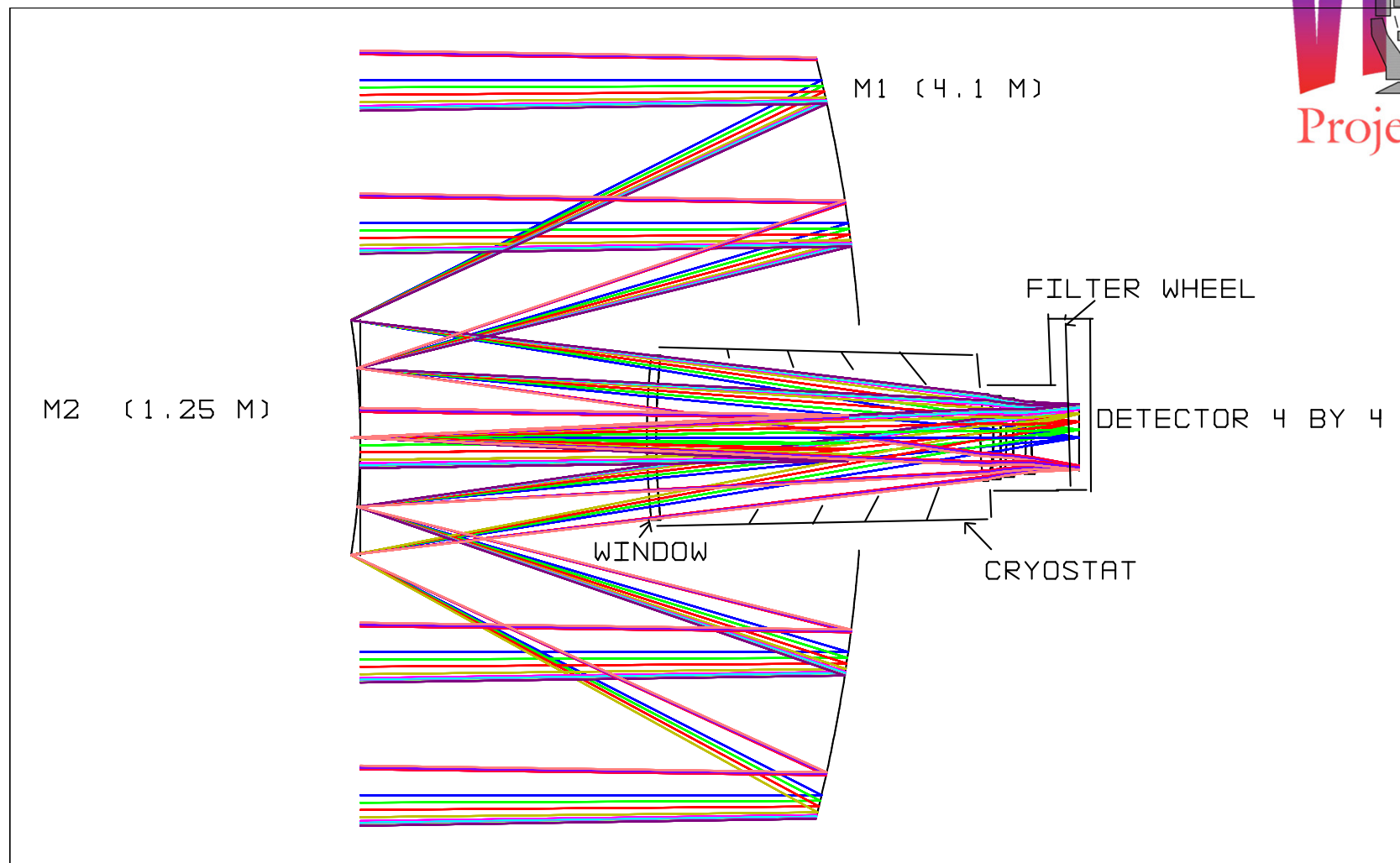
12 Dec 2007

Scrutiny Panel Presentation

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On Axis IR camera - cold baffles





3D LAYOUT

VISTA F/1 IR COLD BAFFLE WITH WINDOW FORWARD
FRI NOV 17 2000

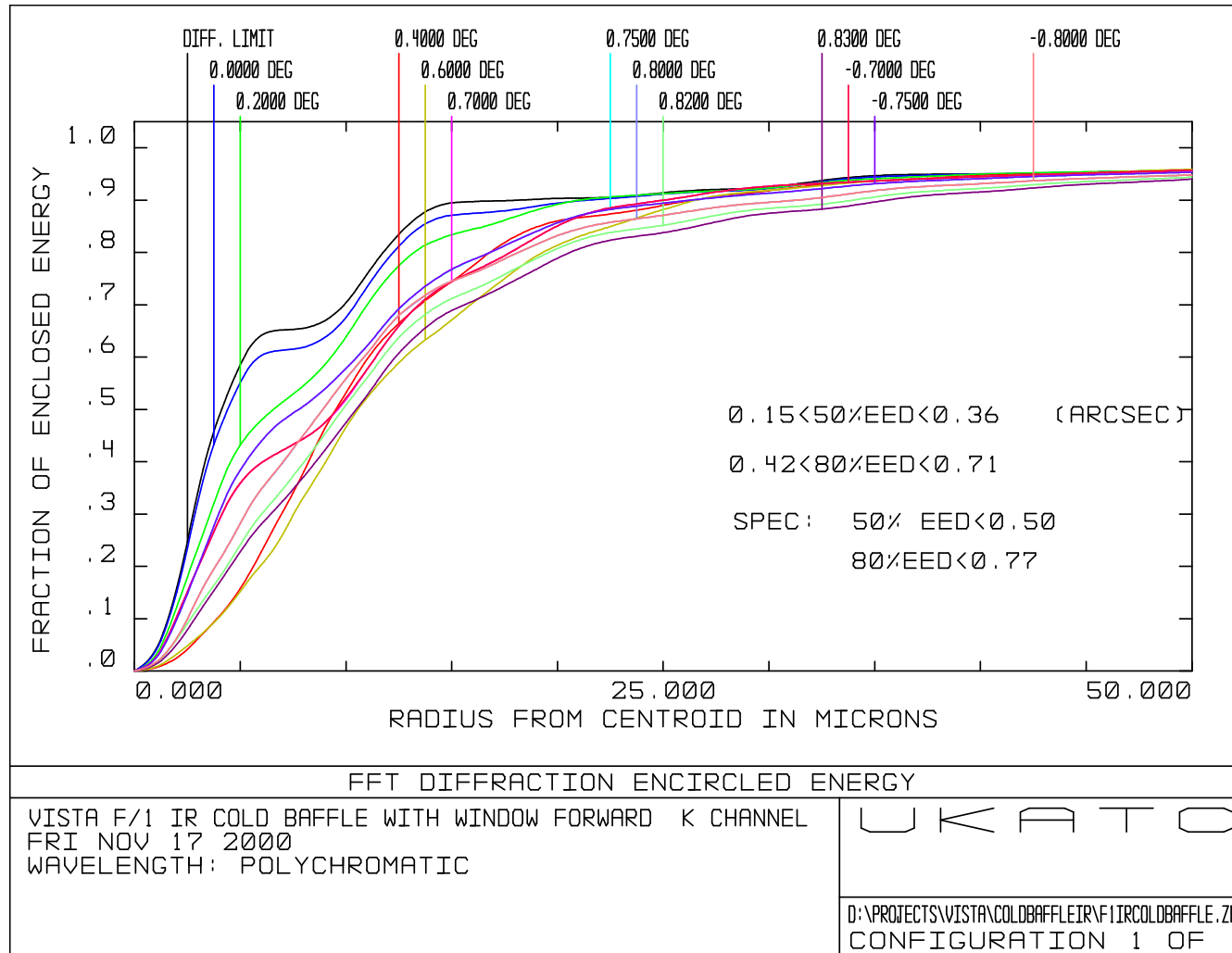
UKATC

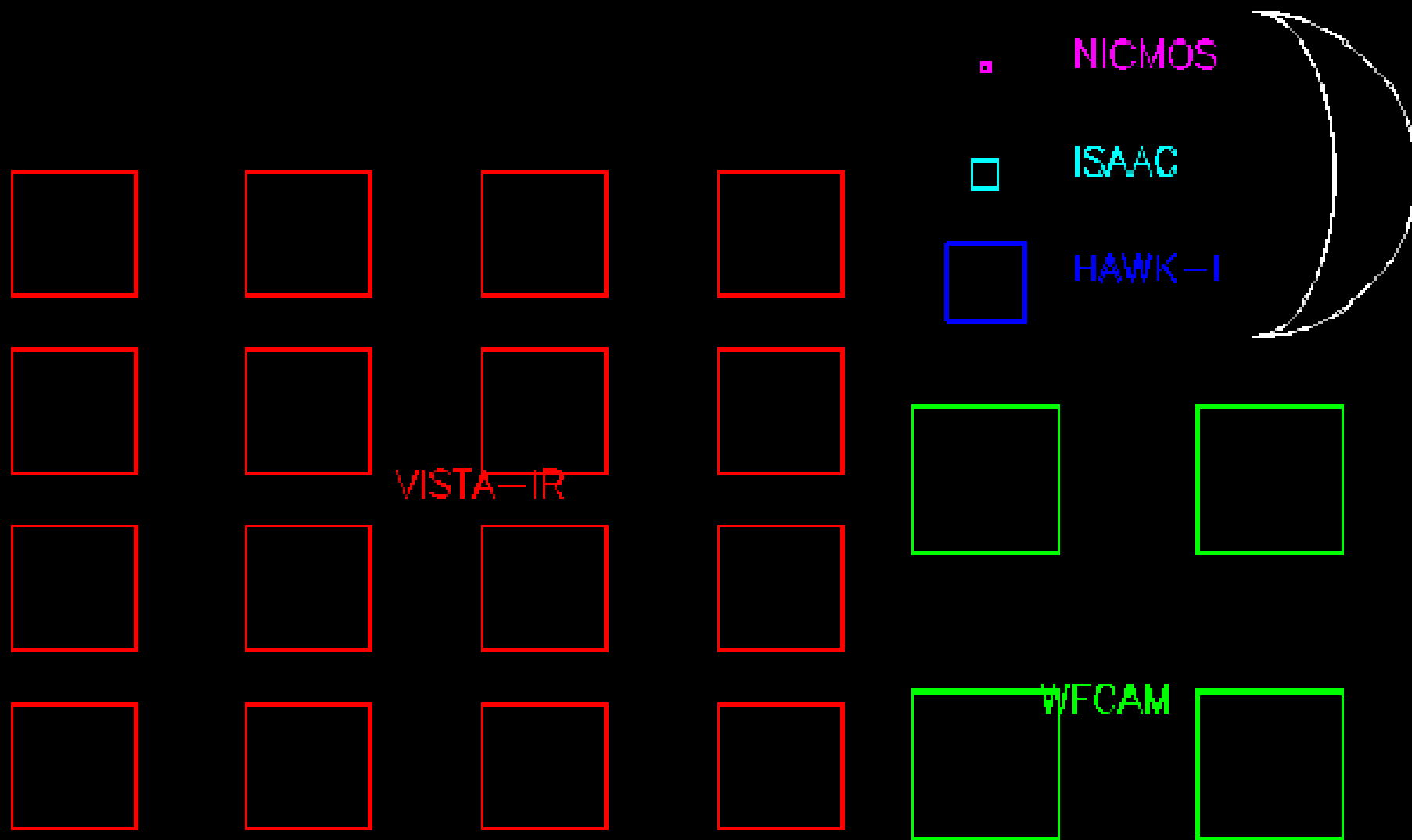
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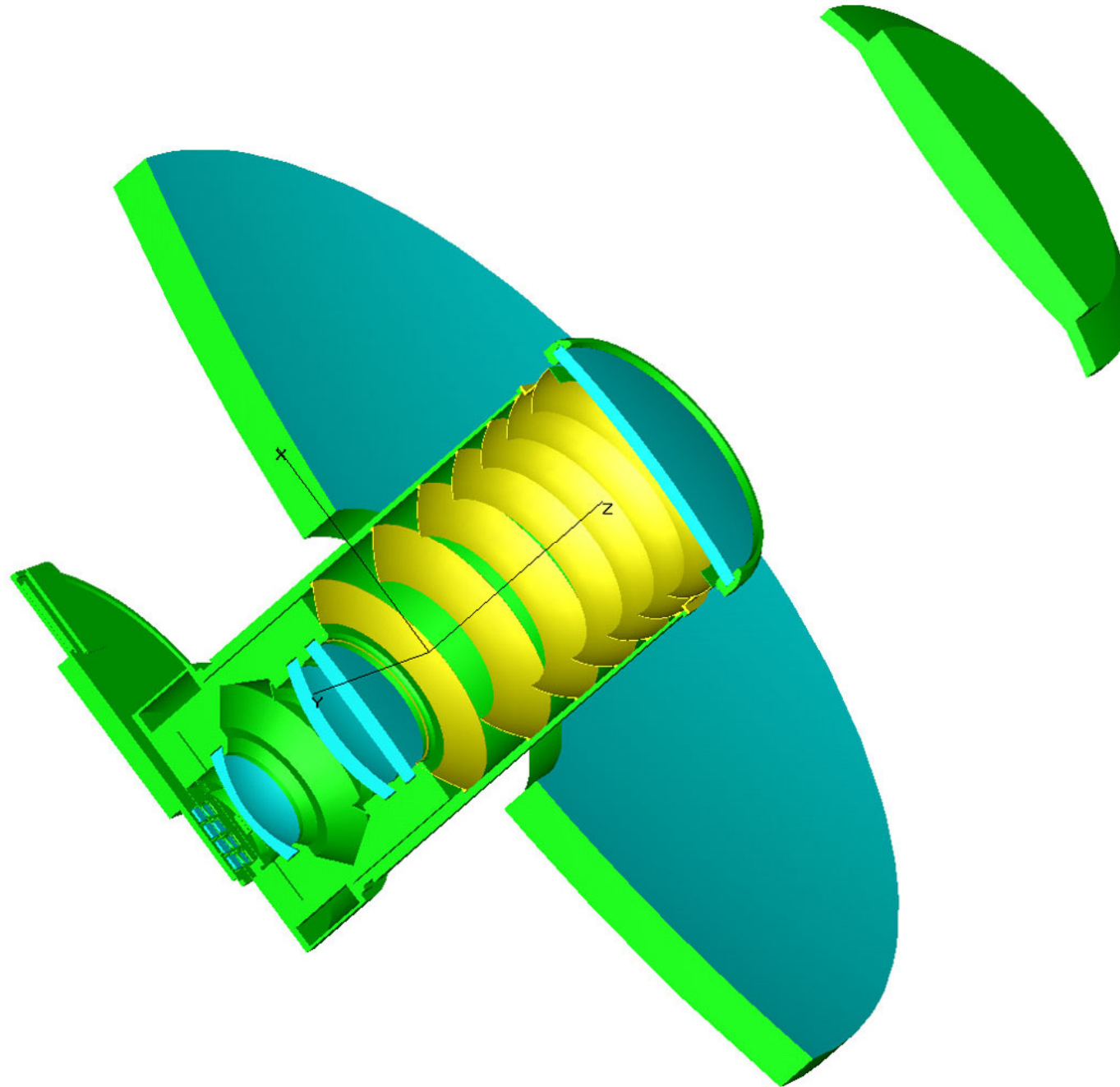
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CONFIGURATION 28
UKATC ALL 1

Encircled Energy at Ks

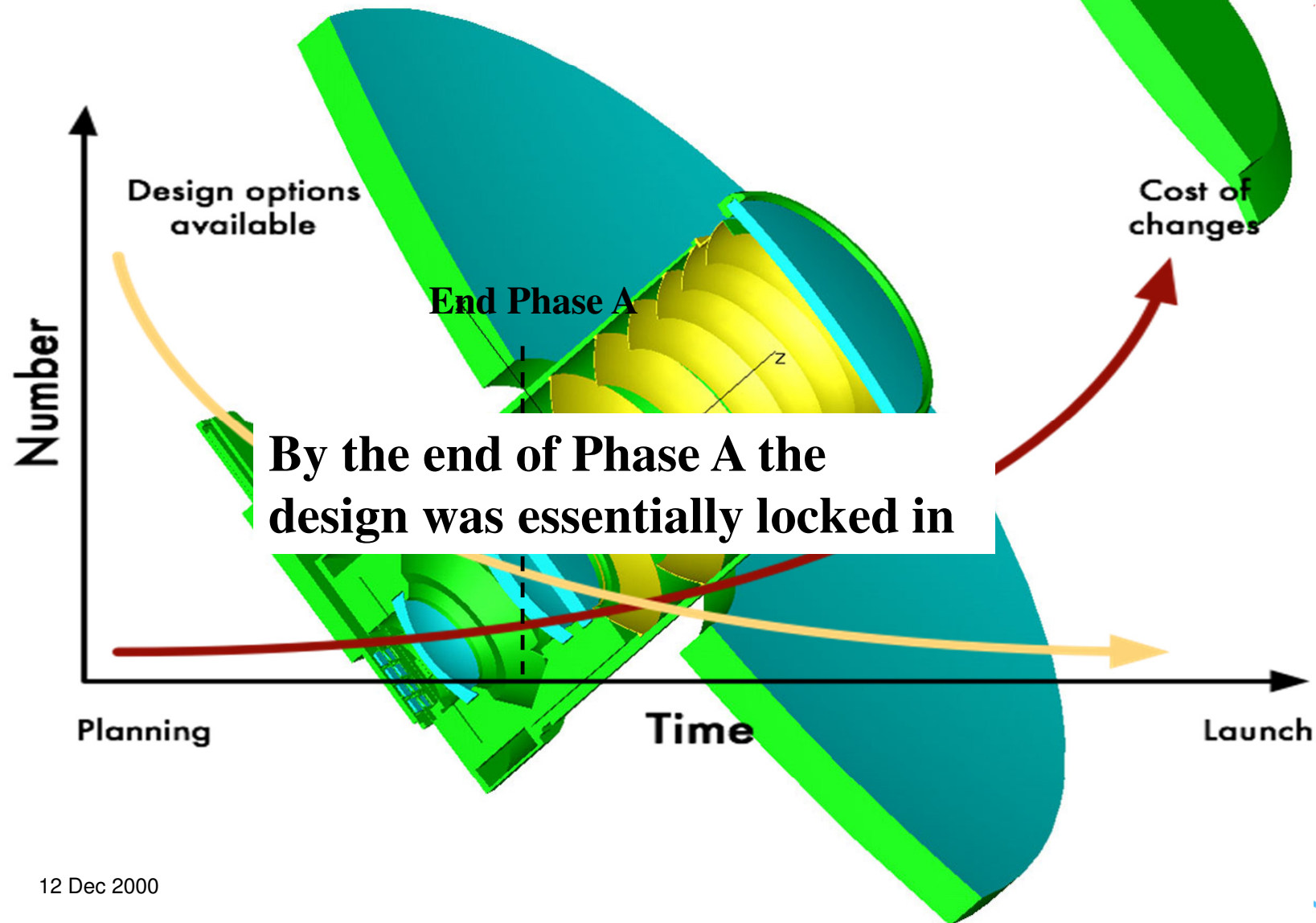


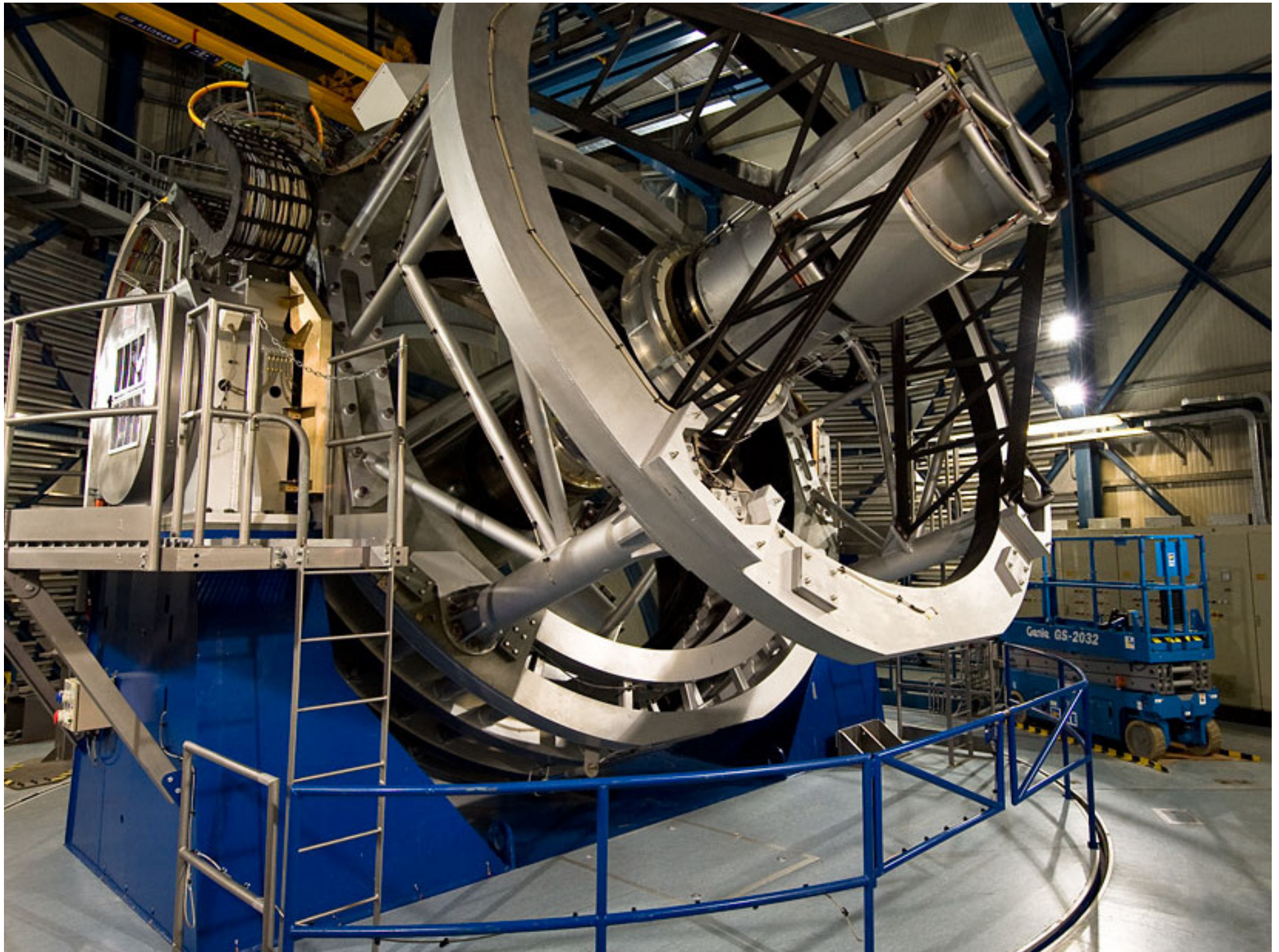


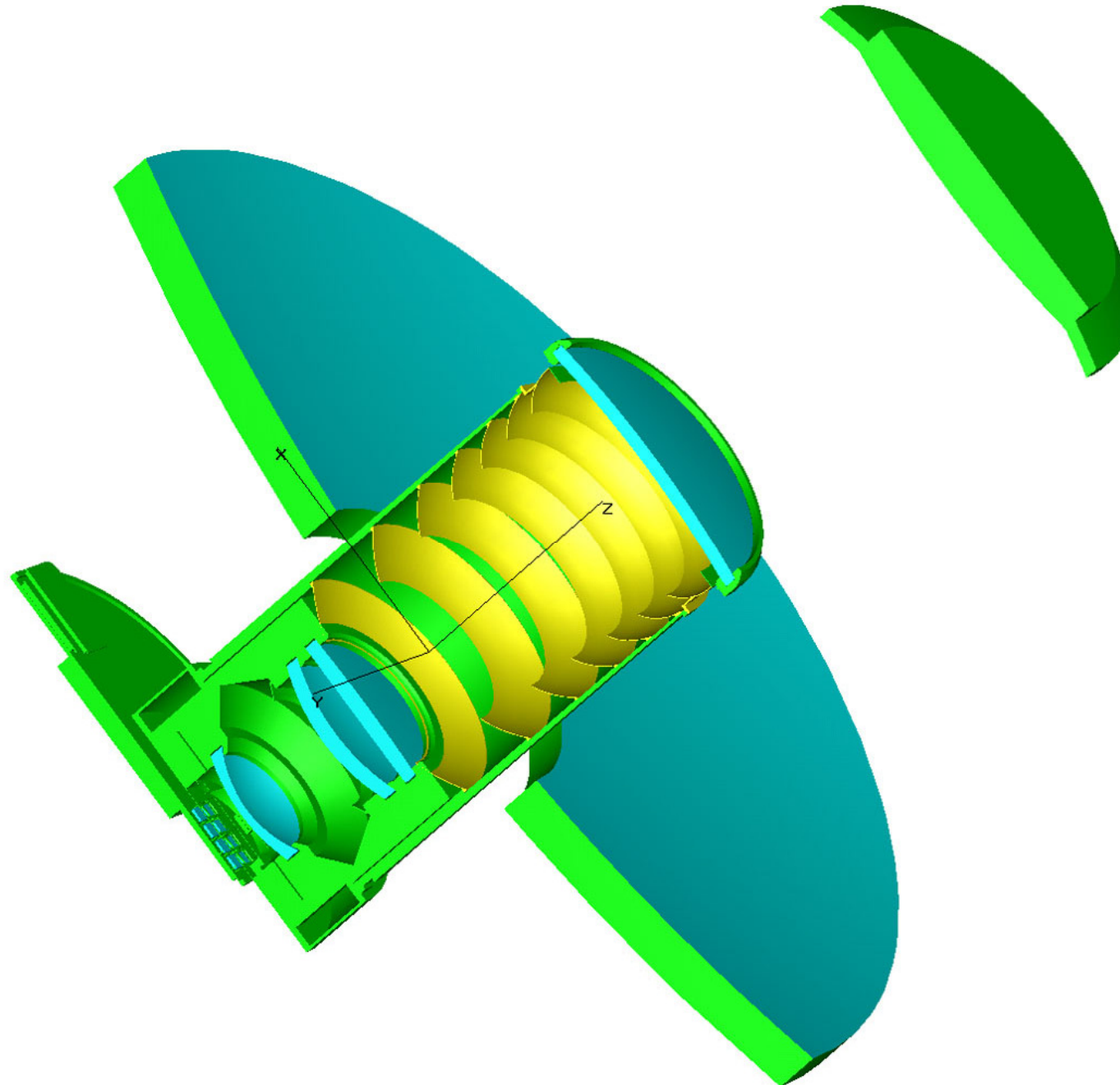
VISTA Field of View



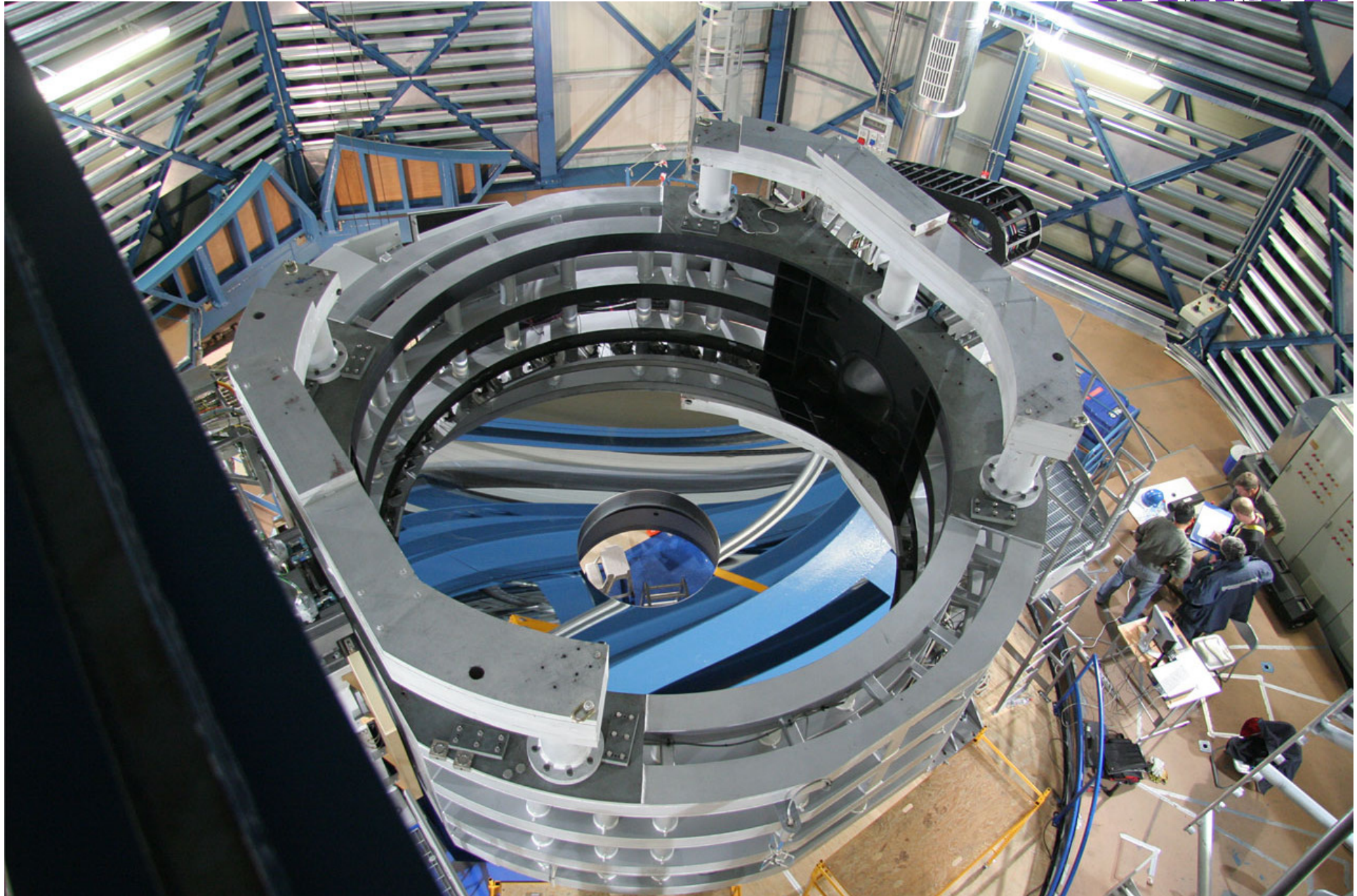
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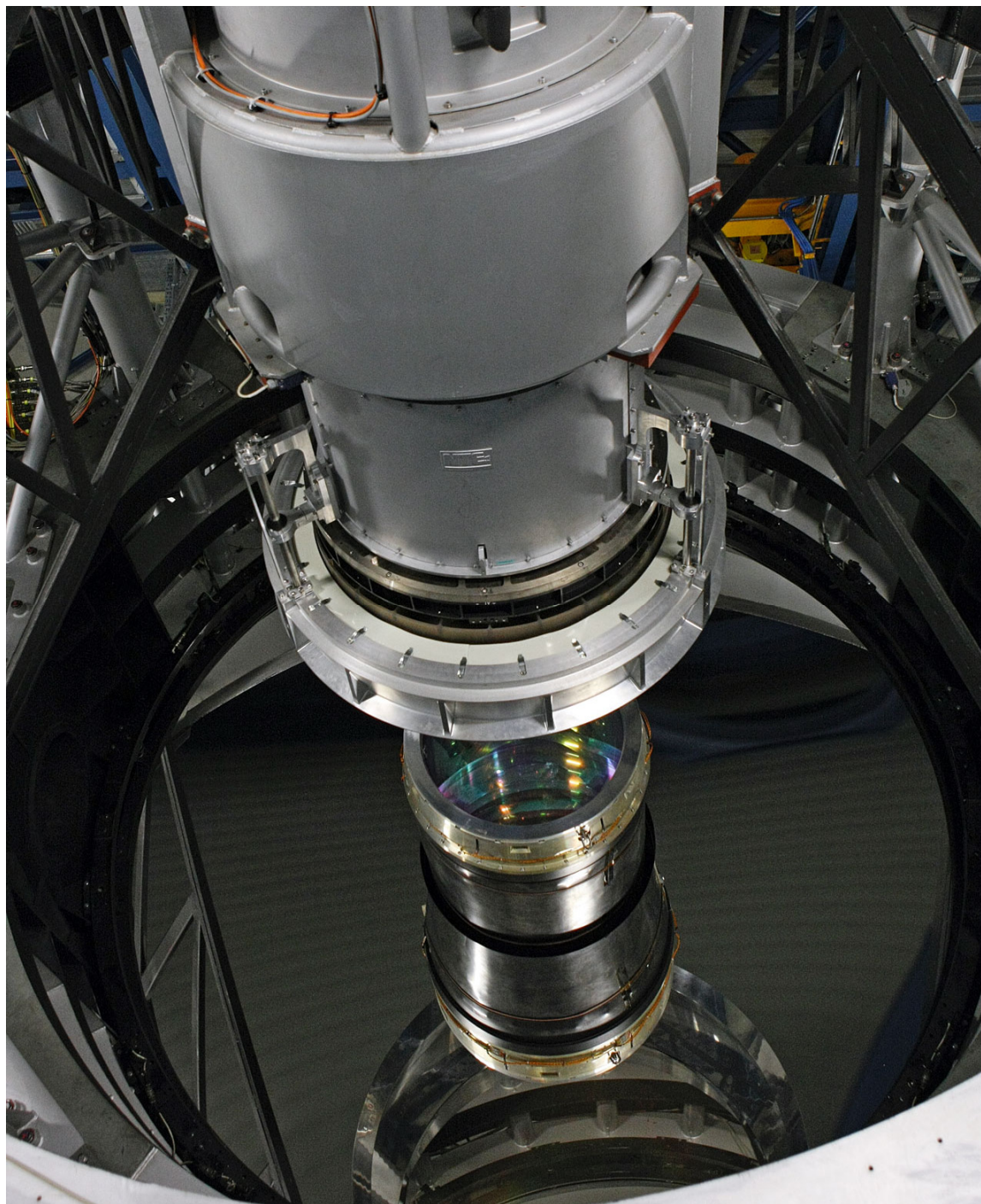
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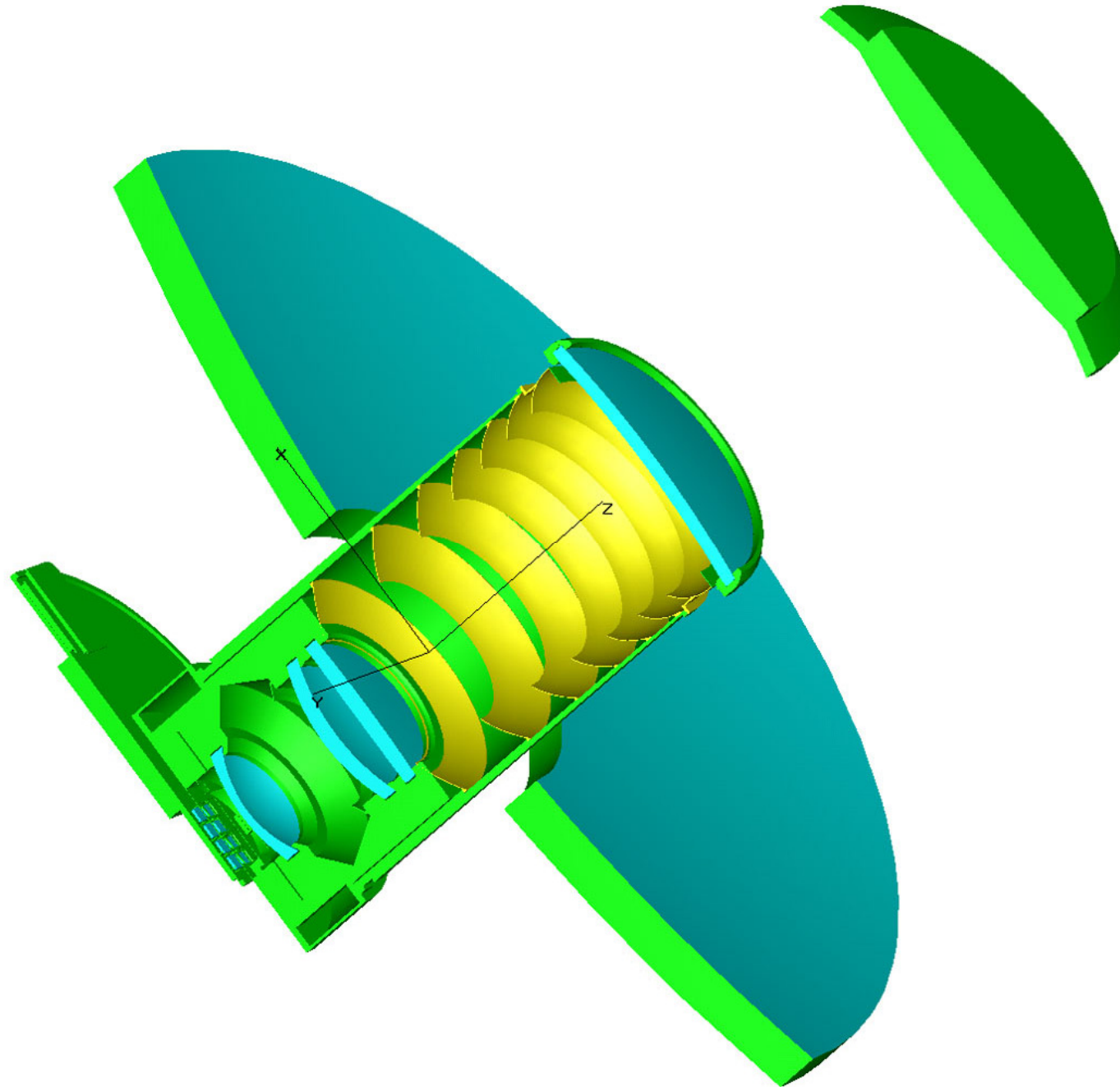
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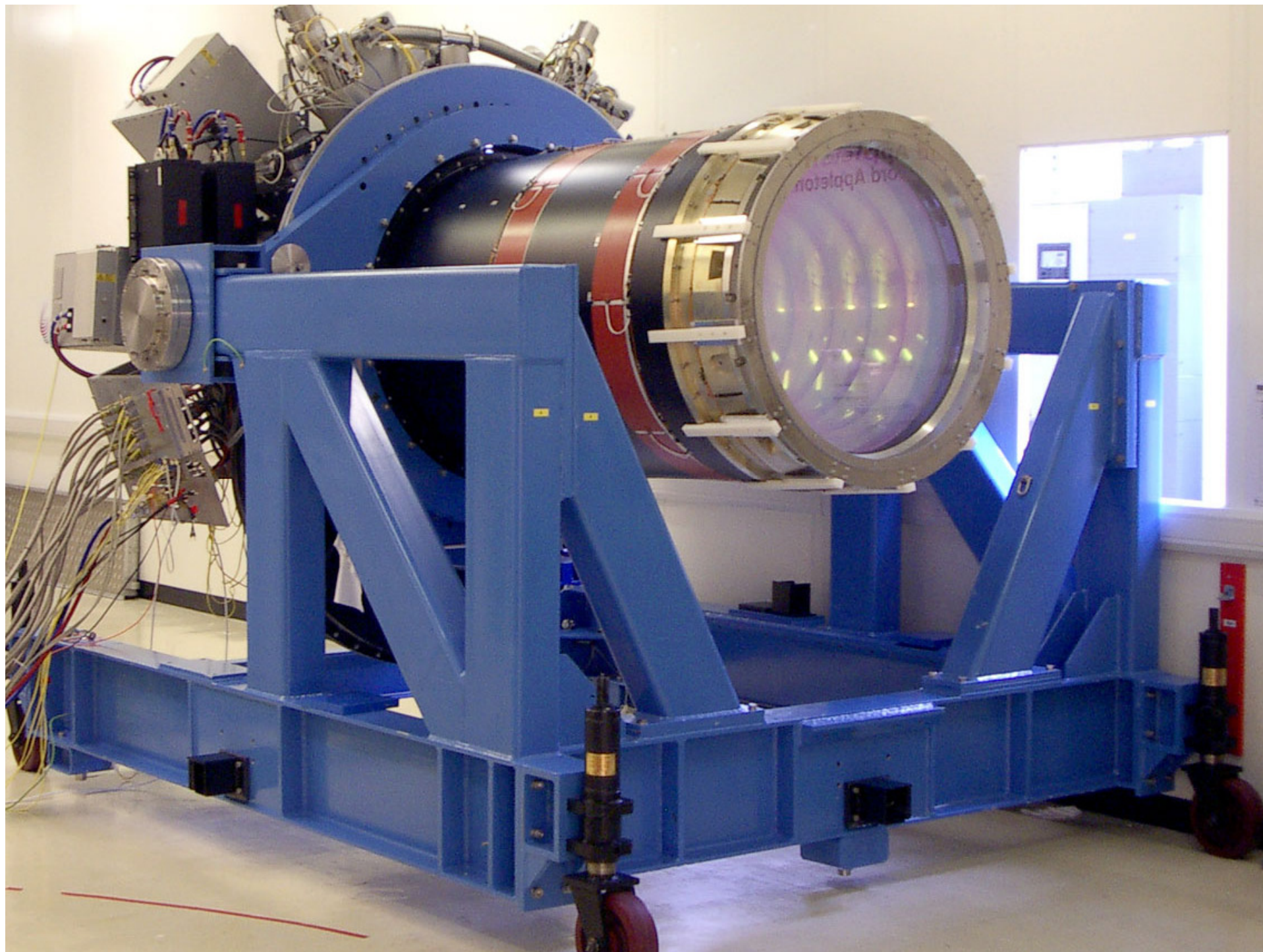
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12 Dec 2000



12 Dec 2000





- **Key players**

- Adrian Russell
- Jim Emerson
- Will Sutherland

- **VISTA f/1 guilty party**

- Mark Casalli
- Eli Atad
- Martin Fisher
- Stefano Stangellini

- **Presentation**

- Andy Born

